

# **IntesisBox<sup>®</sup>**

## **LG-RC-MBS-1 v.1.3**

Modbus RTU (EIA485) Interface for LG air conditioning units.

**User's Manual**

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r1.1

Order Code: **LG-RC-MBS-1**

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Intesis Software S.L.  
Milà i Fontanals, 1 bis  
08700 Igualada  
Spain

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## 1. Presentation

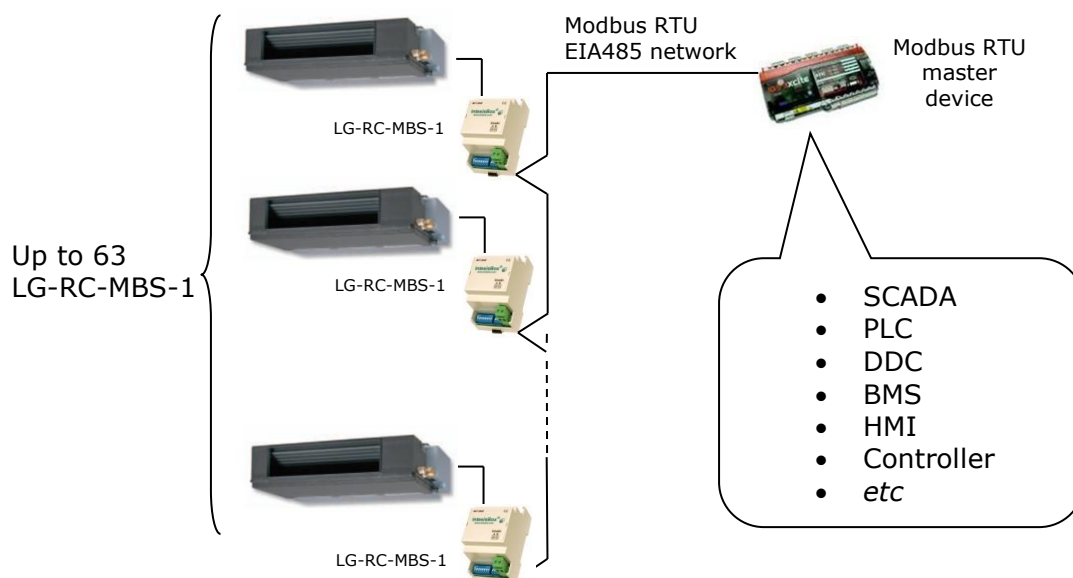


LG-RC-MBS-1 device

The LG-RC-MBS-1 interface allows a complete and natural integration of **LG** air conditioning units into Modbus RTU (EIA485) networks.

### Main features:

- Reduced dimensions. 93 x 53 x 58 mm.
- Quick and easy installation.  
*Mountable on DIN rail, wall, or even inside the indoor unit in some models of AC.*
- External power not required.
- Direct connection to Modbus RTU (EIA485) networks. Up to 63 LG-RC-MBS-1 devices can be connected in the same network (See Figure 1.1).  
*LG-RC-MBS-1 is a Modbus slave device.*
- Direct connection to the AC indoor units.
- Configuration from both on-board DIP-switches and Modbus RTU.
- Total Control and Supervision.
- Real states of the AC unit's internal variables.
- Allows using simultaneously the IR and wired remote controls and Modbus RTU.



**Figure 1.1** LG-RC-MBS-1 Connection capabilities

## 2. Connection

### 2.1 Connection of the interface to the AC indoor unit

The LG-RC-MBS-1 connects directly to the LG 3-wire cable bus. Depending on which controllers are available the recommended connection methods are the following (details in Figure 2.1):

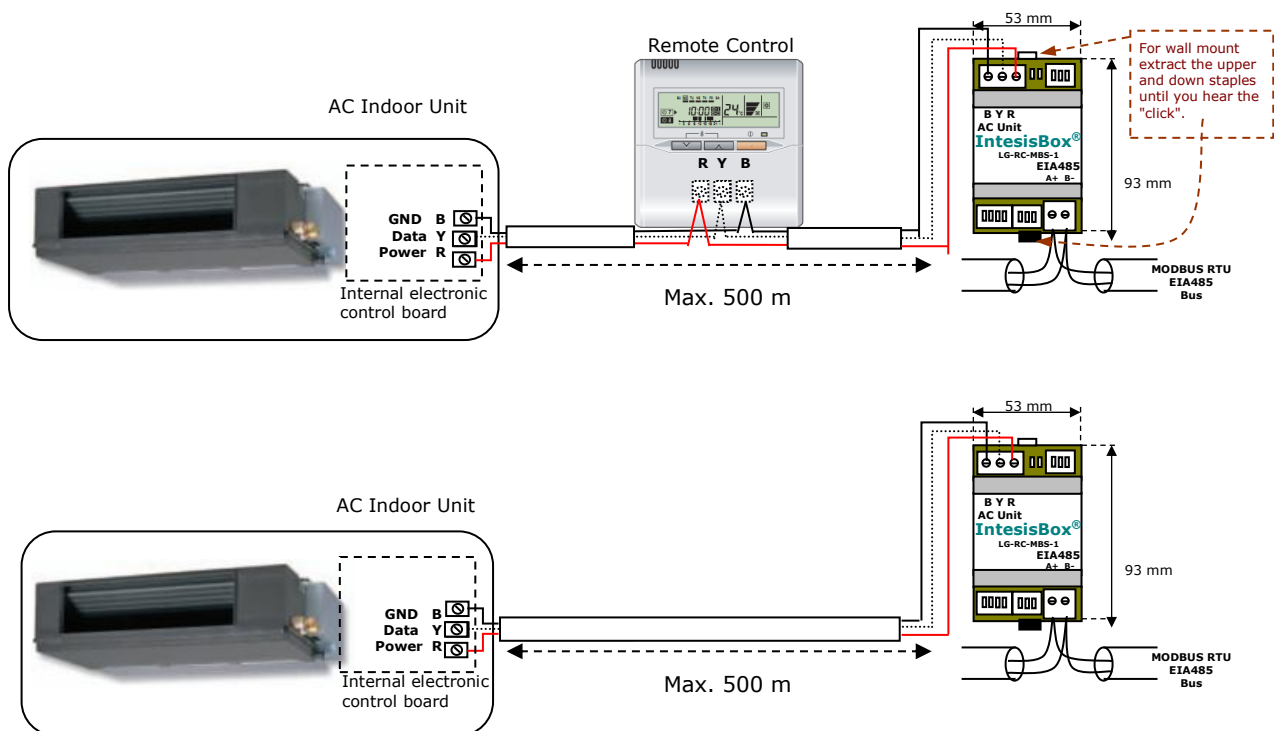
- **Wired remote control available.** Connect the gateway as Slave in parallel with the wired remote controllers (Wall controller acts as master).
- **Infrared remote control available.** Connect the gateway as Master.
- **No remote control available** Connect the gateway directly to the 3-wire bus of the indoor unit as Master when there is no LG remote control.

Disconnect power supply from the AC unit and use a 3-wire cable for the connection of LG-RC-MBS-1, LG wired remote controller and its corresponding indoor unit. Screw the suitably peeled cable ends in the corresponding terminals of each device, as summarized in Figure 2.1.

Maximum connection bus length is 500 meters and has polarity.

### 2.2 Connection of the interface to Modbus

Use the EIA485 connector in the LG-RC-MBS-1 to connect to the Modbus network.



**Figure 2.1** LG-RC-MBS-1 connection diagram

**Attention:** The LG units Type A not allows to install a remote controller and LG-RC-MBS-1 device together.

## **2.3 Power-up**

After the LG-RC-MBS-1 is properly connected, AC unit's main power can be connected again.

Then, it will start an initialization process which can take around 2 minutes before the normal operation starts.

While the initialization is ongoing, some Modbus registers will indicate an undetermined value (see section 3.2). Once the normal operation starts, they will acquire its corresponding value.

It is important to bear in mind that changes made during the initialization process will not have effect until it finishes.

## 3. Modbus Interface Specification

### 3.1 Modbus physical layer

LG-RC-MBS-1 implements a Modbus RTU (slave) interface, to be connected to an EIA485 line. It performs 8N2 (8N1-compatible) communication (8 data bits, no parity and 2 stop bit) with several available baudrates (2400 bps, 4800 bps, 9600 bps -default- and 19200 bps).

### 3.2 Modbus Registers

All registers are of type "16-bit unsigned register", in standard Modbus' big endian notation. The registers are accessible as "Holding registers" or "Inputs registers".

#### 3.2.1 Control and status registers

Register Addr (protocol address)	Register Addr (PLC address)	R/W	Description
0	1	R/W	AC unit On/Off <ul style="list-style-type: none"> <li>0: Off</li> <li>1: On</li> </ul>
1	2	R/W	AC unit Mode <ul style="list-style-type: none"> <li>0: Auto</li> <li>1: Heat</li> <li>2: Dry</li> <li>3: Fan</li> <li>4: Cool</li> </ul>
2	3	R/W	AC unit Fan Speed <sup>1</sup> <ul style="list-style-type: none"> <li>0: Auto</li> <li>1: Super Low</li> <li>2: Low</li> <li>3: Med</li> <li>4: High</li> <li>5: Super High</li> </ul>
3	4	R/W	AC unit Vane Position <sup>1</sup> <ul style="list-style-type: none"> <li>0: No Swing</li> <li>1: Swing</li> <li>2: Swirl</li> </ul>
4	5	R/W	AC unit Temperature Setpoint <sup>2,3</sup> <ul style="list-style-type: none"> <li>16..30 (°C) (0 = undetermined)</li> <li>61..104 (°F) (0 = undetermined)</li> </ul>
5	6	R	Indoor Unit Reference Temperature <sup>3</sup> <ul style="list-style-type: none"> <li>16..40 (°C) (0 = undetermined)</li> <li>61..86 (°F) (0 = undetermined)</li> <li>0x8000 There is no temperature sent from the Remote controller.</li> </ul>
6	7	R/W	Window Contact <sup>4</sup> <ul style="list-style-type: none"> <li>0: Closed</li> <li>1: Open</li> </ul>
7	8	R/W	Device Disablement <sup>4</sup> <ul style="list-style-type: none"> <li>0: LG-RC-MBS-1 enabled</li> <li>1: LG-RC-MBS-1 disabled</li> </ul>
8	9	R/W	Remote Controller Disablement <sup>4</sup> <ul style="list-style-type: none"> <li>0: Remote Controller enabled</li> <li>1: Remote Controller disabled</li> </ul>

<sup>1</sup> Configurable according to Table 3.1

<sup>2</sup> Magnitude for this register can be adjusted through DIP switch (Check Table 3.4)

<sup>3</sup> More information in section 3.5.2

<sup>4</sup> See explanation of this functionality in section 3.5

Register Addr (protocol address)	Register Addr (PLC address)	R/W	Description
9	10	R/W	AC unit Operation Time <sup>5</sup> <ul style="list-style-type: none"> <li>0..65535 (hours). Counts the time the AC unit is in "On" state.</li> </ul>
10	11	R	AC unit Alarm Status <ul style="list-style-type: none"> <li>0: No alarm condition</li> <li>1: Alarm condition</li> </ul>
11	12	R	Error Code <ul style="list-style-type: none"> <li>-1 Communication error.</li> <li>Other look in section 0</li> </ul>
22	23	R/W	External temperature sensor Ranges are manufacturer specific Can be °C or °F, x1 or x10 0x8000 (-32768d) means "no input sensor"
23	24	R	AC real setpoint Ranges are manufacturer specific Can be °C or °F, x1 or x10
24	25	R	Current AC MAX setpoint Ranges are manufacturer specific Can be °C or °F, x1 or x10
25	26	R	Current AC min setpoint Ranges are manufacturer specific Can be °C or °F, x1 or x10
26	27	R/W	Vane L/R position <ul style="list-style-type: none"> <li>0 - AUTO; 1-POS1 ... 9 - POS9; 10-SWING</li> </ul>
65	66	R	Input reference temperature Can be °C or °F, x1 or x10

### 3.2.2 Configuration Registers

Register Address (protocol address)	Register Address (PLC address)	R/W	Description
13	14	R/W	"Open Window" switch-off timeout <sup>6, 7</sup> <ul style="list-style-type: none"> <li>0..30 (minutes)</li> <li>Factory setting: 30 (minutes)</li> </ul>
14	15	R	Modbus RTU baudrate (bps) <sup>7</sup> <ul style="list-style-type: none"> <li>2400, 4800, 9600, 19200</li> </ul>
15	16	R	Device's Modbus slave address <ul style="list-style-type: none"> <li>1..63</li> </ul>
21	22	R	Max number of fan speeds <ul style="list-style-type: none"> <li>1..5: must be configured according to the number of fan speeds supported by the AC unit</li> </ul>
48	49	R	Switch value
49	50	R	Device Identification <ul style="list-style-type: none"> <li>LG-RC-MBS-1: 0x0F00</li> </ul>
50	51	R	Software version

<sup>5</sup> This value is stored in non-volatile memory.

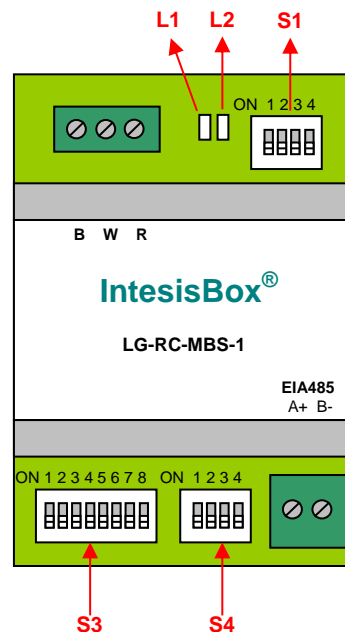
<sup>6</sup> Once window contact is open, a count-down to switch off the AC Unit will start from this configured value

<sup>7</sup> Configurable through S3 (See Table 3.3)



### 3.3 DIP-switch Configuration Interface

In this section, values of the configuration switches and their meaning are specified:



**Figure 3.1** LG-RC-MBS-1

**S1** – AC unit configuration: Master/Slave, Slave of Operating Mode and Machine Type

Binary value $b_3...b_0$	Decimal value	Switches 1 2 3 4	Description
0xxx	0	↓ x x x	Slave (default value) – A LG Controller must be present in the bus, configured as Master.
1xxx	1	↑ x x x	Master in the bus – LG Controller not needed in the bus. If existing, it must be configured as Slave.
x0xx	0	x ↓ x x	Error Type_B (default value)
x1xx	1	x ↑ x x	Error Type_A
xx0x	0	x x ↓ x	Min ambient temp not applied
Xx1x	1	x x ↑ x	Min ambient temp applied
xxx0	0	x x x ↓	KEEP SWITCH IN THIS POSITION (default value)
xxx1	1	x x x ↑	DO NOT TURN SWITCH INTO THIS POSITION (not applicable).

**Table 3.1** S1 Switch configuration

**S3 – Modbus protocol: Slave address and baudrate**

Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8	Add	Switches 1 2 3 4 5 6 7 8
0	↓ ↓ ↓ ↓ ↓ ↓ x x	16	↓ ↓ ↓ ↓ ↑ ↓ x x	32	↓ ↓ ↓ ↓ ↓ ↑ x x	48	↓ ↓ ↓ ↓ ↑ ↑ x x
1*	↑ ↓ ↓ ↓ ↓ ↓ x x	17	↑ ↓ ↓ ↓ ↑ ↓ x x	33	↑ ↓ ↓ ↓ ↓ ↑ x x	49	↑ ↓ ↓ ↓ ↑ ↑ x x
2	↓ ↑ ↓ ↓ ↓ ↓ x x	18	↓ ↑ ↓ ↓ ↑ ↓ x x	34	↓ ↑ ↓ ↓ ↓ ↑ x x	50	↓ ↑ ↓ ↓ ↑ ↑ x x
3	↑ ↑ ↓ ↓ ↓ ↓ x x	19	↑ ↑ ↓ ↓ ↑ ↓ x x	35	↑ ↑ ↓ ↓ ↓ ↑ x x	51	↑ ↑ ↓ ↓ ↑ ↑ x x
4	↓ ↓ ↑ ↓ ↓ ↓ x x	20	↓ ↓ ↑ ↓ ↑ ↓ x x	36	↓ ↓ ↑ ↓ ↓ ↑ x x	52	↓ ↓ ↑ ↓ ↑ ↑ x x
5	↑ ↓ ↑ ↓ ↓ ↓ x x	21	↑ ↓ ↑ ↓ ↑ ↓ x x	37	↑ ↓ ↑ ↓ ↓ ↑ x x	53	↑ ↓ ↑ ↓ ↑ ↑ x x
6	↓ ↑ ↑ ↓ ↓ ↓ x x	22	↓ ↑ ↑ ↓ ↑ ↓ x x	38	↓ ↑ ↑ ↓ ↓ ↑ x x	54	↓ ↑ ↑ ↓ ↑ ↑ x x
7	↑ ↑ ↑ ↓ ↓ ↓ x x	23	↑ ↑ ↑ ↓ ↑ ↓ x x	39	↑ ↑ ↑ ↓ ↓ ↑ x x	55	↑ ↑ ↑ ↓ ↑ ↑ x x
8	↓ ↓ ↓ ↑ ↓ ↓ x x	24	↓ ↓ ↓ ↑ ↑ ↓ x x	40	↓ ↓ ↓ ↑ ↓ ↑ x x	56	↓ ↓ ↓ ↑ ↑ ↑ x x
9	↑ ↓ ↓ ↑ ↓ ↓ x x	25	↑ ↓ ↓ ↑ ↑ ↓ x x	41	↑ ↓ ↓ ↑ ↓ ↑ x x	57	↑ ↓ ↓ ↑ ↑ ↑ x x
10	↓ ↑ ↓ ↑ ↓ ↓ x x	26	↓ ↑ ↓ ↑ ↑ ↓ x x	42	↓ ↑ ↓ ↑ ↓ ↑ x x	58	↓ ↑ ↓ ↑ ↑ ↑ x x
11	↑ ↑ ↓ ↑ ↓ ↓ x x	27	↑ ↑ ↓ ↑ ↑ ↓ x x	43	↑ ↑ ↓ ↑ ↓ ↑ x x	59	↑ ↑ ↓ ↑ ↑ ↑ x x
12	↓ ↓ ↑ ↑ ↓ ↓ x x	28	↓ ↓ ↑ ↑ ↑ ↓ x x	44	↓ ↓ ↑ ↑ ↓ ↑ x x	60	↓ ↓ ↑ ↑ ↑ ↑ x x
13	↑ ↓ ↑ ↑ ↓ ↓ x x	29	↑ ↓ ↑ ↑ ↑ ↓ x x	45	↑ ↓ ↑ ↑ ↓ ↑ x x	61	↑ ↓ ↑ ↑ ↑ ↑ x x
14	↓ ↑ ↑ ↑ ↓ ↓ x x	30	↓ ↑ ↑ ↑ ↑ ↓ x x	46	↓ ↑ ↑ ↑ ↓ ↑ x x	62	↓ ↑ ↑ ↑ ↑ ↑ x x
15	↑ ↑ ↑ ↑ ↓ ↓ x x	31	↑ ↑ ↑ ↑ ↑ ↓ x x	47	↑ ↑ ↑ ↑ ↓ ↑ x x	63	↑ ↑ ↑ ↑ ↑ ↑ x x

**Table 3.2 S3 Modbus Slave address**

Binary value b <sub>0</sub> ...b <sub>7</sub>	Decimal value	Switches 1 2 3 4 5 6 7 8	Description
xxxxxx00	0	x x x x x x ↓ ↓	2400bps
xxxxxx10	1	x x x x x x ↑ ↓	4800bps
xxxxxx01	2	x x x x x x ↓ ↑	9600bps (- default value)
xxxxxx11	3	x x x x x x ↑ ↑	19200bps

**Table 3.3 S3 Modbus baudrate****S4 – Temperature and termination: Degrees/Decidegrees (x10), temperature magnitude (°C/°F), number of fan speeds and EIA485 termination resistor.**

Binary value b <sub>0</sub> ...b <sub>3</sub>	Decimal value	Switches 1 2 3 4	Description
0xxx	0	↓ x x x	Temperature values in Modbus register are represented in degrees (x1) (default value)
1xxx	1	↑ x x x	Temperature values in Modbus register are represented in decidegrees (x10)
x0xx	0	x ↓ x x	Temperature values in Modbus register are represented in Celsius degrees (default value)
x1xx	1	x ↑ x x	Temperature values in Modbus register are represented in Fahrenheit degrees
xx0x	0	x x ↓ x	KEEP SWITCH IN THIS POSITION (default value)
xx1x	1	x x ↑ x	DO NOT TURN SWITCH INTO THIS POSITION (not applicable).
xxx0	0	x x x ↓	EIA485 bus without termination resistor (default value)
xxx1	1	x x x ↑	Internal termination resistor of 120Ω connected to EIA485 bus**

**Table 3.4 S4 Temperature and termination configuration**

\* Default value

\*\* The termination resistor must only be activated in the interfaces connected at both ends of the bus, not in the rest. The EIA485 bus can be biased through internal jumpers JP2 and JP3. See section 3.7.

### 3.4 Implemented Functions

LG-RC-MBS-1 implements the following standard Modbus functions:

- 3: Read Holding Registers
- 4: Read Input Registers
- 6: Write Single Register
- 16: Write Multiple Registers (Although this function is allowed, the interface does not allow write operations of more than 1 register with the same request, this means that length field should always be 1 when using this function for writes)

The maximum number of registers that can be read in a single request is 100.

### 3.5 Special behaviors

#### 3.5.1 Window contact

The LG-RC-MBS-1 has the functionality of automatically control the turning off of the AC indoor unit depending on the state of the window contact register.

The AC indoor unit will be turned OFF if the window contact register indicates “window opened” for a certain period of time (default value: 30 minutes).

If the AC unit is turned on through either the remote controller or the On/Off register and the window contact is still indicating “window opened”, it will restart the countdown of the 30 minutes and after that it will turn OFF the AC unit again.

If the window contact register is indicating “window closed”, this functionality will have no effect to the normal operation.

#### 3.5.2 Considerations on LG-RC-MBS-1 temperature registers

LG-RC-MBS-1 implements two registers containing temperature values:

- **AC unit Temperature Setpoint (R/W)** (register 5 – in PLC addressing): This is the adjustable temperature setpoint meant to be required by the user. This register can be read (Modbus function 3 or 4) or written (modbus functions 5 or 16). A remote controller connected to the 3-wire bus of the LG indoor unit will report the same temperature setpoint value as this register.
- **AC unit external reference temperature (R/W)** (register 23 – in PLC addressing): This register allows providing an external temperature reference from Modbus side. If an external temperature is provided through this register, indoor unit will use it as reference for its temperature control loop.
  - This register will have no effect in those LG RAC / domestic line splits Air-Conditioning units – this is, those models requiring an additional communication accessory enabling communication with LG-RC-MBS-1.
  - For this temperature to take effect it is required that the LG AC indoor unit is configured in such a way that it uses the “thermostat sensor in the remote controller” (this is, LG-RC-MBS-1 will act as thermostat sensor providing a temperature sensor reading).
  - This configuration is done via a LG remote controller connected to the indoor unit (Function number “42” – setting value “1” / operation of Thermosensor button) and must be done by LG authorized installers at the time of the installation of the AC.
  - Register value after LG-RC-MBS-1 startup is -32768, which means that no temperature reference is provided to the AC indoor unit. In that case, AC indoor unit will use its own return path temperature sensor as reference for its control loop.

Additionally, note that temperature values from all these three registers are expressed according to the temperature format configured through its onboard DIP-Switches (See 0). Following formats are possible:

- Celsius value: Value in Modbus register is the temperature value in Celsius (i.e. a value "22" in the Modbus register must be interpreted as 22°C)
- Decicelsius value: Value in Modbus register is the temperature value in decicelsius (i.e. a value "220" in the Modbus register must be interpreted as 22.0°C)
- Fahrenheit value: Value in Modbus register is the temperature value in Fahrenheit (i.e. a value "72" in the Modbus register must be interpreted as 72°F (~22°C).

### 3.5.3 Device disablement

If the device disablement register is set to 1, it will not allow the LG-RC-MBS-1 to change the state of the AC unit. All the Modbus registers will show the current state of the AC unit as if they were "Read Only registers".

### 3.5.4 Remote controller disablement

When the remote controller is disabled, changes made by the remote controller will be corrected by the LG-RC-MBS-1 setting the previous value. In this way, the LG-RC-MBS-1 will prevent the remote controller from changing the state of the AC unit.

## 3.6 Device LED indicator

The device includes two LED indicators (check Figure 3.1) to signal its different possible operational states. Their meaning is explained in this section:

L1 (green)			
Operation	ON	OFF	Meaning
Blinking	500 ms	500 ms	Error
Flashing	100 ms	1900 ms	Normal operation (configured and working)

L2 (red)			
Operation	ON	OFF	Meaning
Pulse	3 sec	--	Undervoltage

L1 (green) & L2 (red)			
Operation	ON	OFF	Meaning
Pulse	5 sec	--	Device start-up
Alternate blinking	500 ms	500 ms	Flash checksum not OK

### 3.7 EIA485 bus. Termination resistors and Fail Safe Biasing mechanism

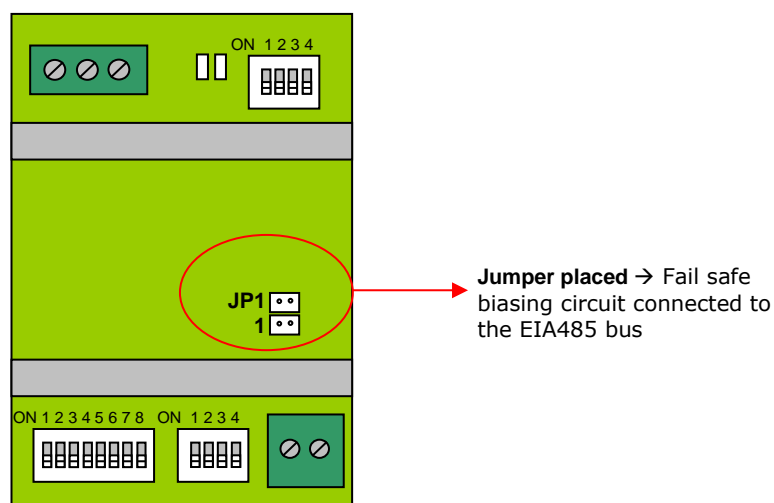
EIA485 bus requires a 120Ω terminator resistor at each end of the bus to avoid signal reflections.

The LG-RC-MBS-1 device includes an on-board terminator resistor of 120Ω that can be connected to the EIA485 bus by using DIP-switch (Table 3.4).

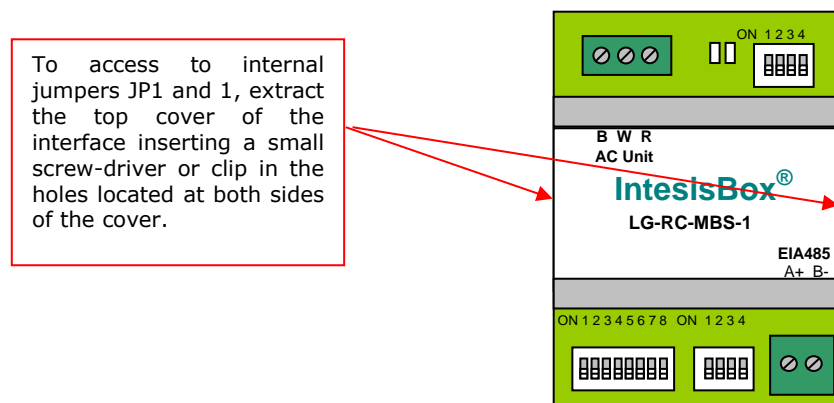
A fail safe biasing circuit has also been included in the board of LG-RC-MBS-1, it can be connected to the EIA485 bus by placing internal JP1 and 1 jumpers (see details in Figure 3.2). This fail safe biasing of the EIA485 bus must only be supplied by one of the devices connected to the bus.

*Some Modbus RTU EIA485 master devices can provide also internal 120Ω terminator resistor and/or fail safe biasing (consult the technical documentation of the master device connected to the EIA485 network in every case).*

Location of jumper and DIP-switches for EIA485 bus Termination resistor or Fail Safe Biasing selection:



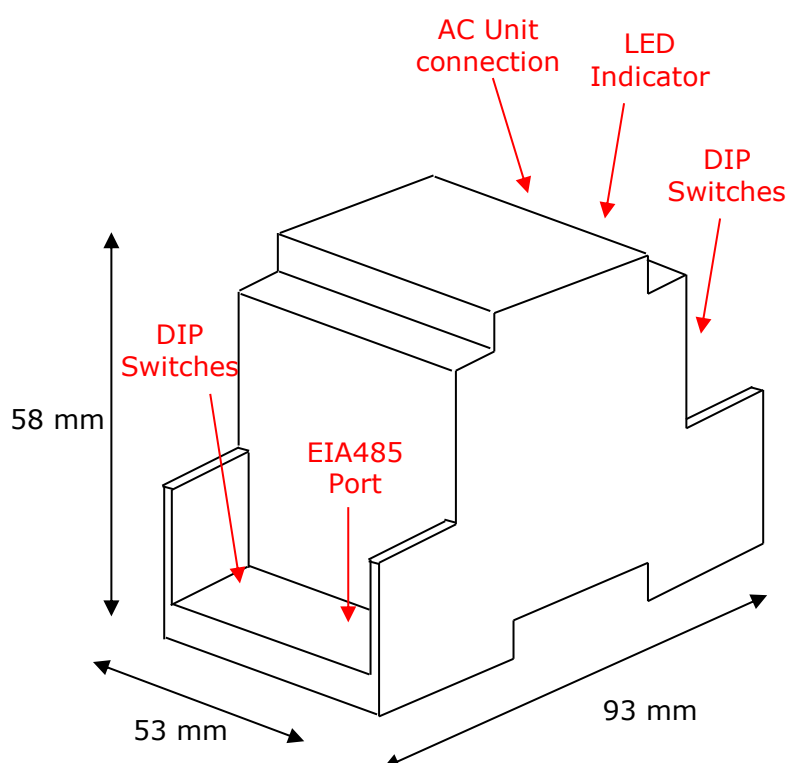
**Figure 3.2** Fail Safe jumper



**Figure 3.3** Accessing the jumper

## 4. Specifications

<b>Dimensions:</b>	93 x 53 x 58 mm
<b>Weight:</b>	85 g
<b>Consumption Current:</b>	80 mA
<b>Operating Temperature:</b>	0 . . . 40°C
<b>Stock Temperature:</b>	-40 . . . 85°C
<b>Operating Humidity:</b>	<95% RH, non-condensing
<b>Stock Humidity:</b>	<95% RH, non-condensing
<b>Isolation voltage:</b>	1000 VDC
<b>Isolation resistance:</b>	1000 MΩ
<b>Modbus Media:</b>	Compatible with Modbus RTU - EIA485 networks



**Figure 4.1** LG-RC-MBS-1 external sketch

## 5. AC Unit Types Compatibility

A list of LG indoor unit model references compatible with LG-RC-MBS-1 and their available features can be found in:

[http://www.intesis.com/pdf/IntesisBox\\_LG-RC-xxx-1\\_AC\\_Compatibility.pdf](http://www.intesis.com/pdf/IntesisBox_LG-RC-xxx-1_AC_Compatibility.pdf)

## 6. Error Codes

Error in Modbus	Error in Remote Controller	Error Description
1	1	Room air sensor fault
2	2	Indoor unit pipe in sensor fault
3	3	communication fault between wired remote controller and indoor unit
4	4	Drain pump fault
5	5	Communication fault between indoor unit and outdoor unit
6	6	Indoor unit pipe out sensor fault
7	7	Indoor unit mode runs on opposite to outdoor unit
8	8	N/A
9	9	EEPROM memory fault
10	10	BLDC motor signal fault or motor lock
11	11	HEX middle point sensor fault
12	12	heater terminal block sensor fault
13	13	N/A
14	14	N/A
15	15	N/A
16	16	N/A
17	17	Outlet air sensor fault
18	18	Return air sensor fault
19	19	No communication response from sub PCB to main PCB
20	20	No communication response from main PCB to sub PCB
21	21	IPM fault
22	22	AC input is over current (RMS)
23	23	DC link low or high voltage
24	24	High pressure or low pressure switch on
25	25	High/low input voltage
26	26	Compressor start failure
27	27	PSC/PFC fault
28	28	DC link high voltage
29	29	Over current at compressor input
32	32	Discharge temperature is high at inverter compressor
33	33	Discharge temperature is high at constant speed compressor
34	34	High pressure is too high
35	35	Low pressure is too low
36	36	Compression ratio is too low
39	39	Communication fault between PFC and inverter PCB
40	40	CT sensor fault
41	41	Discharge sensor at inverter compressor is fault
42	42	Low pressure sensor is fault
43	43	High pressure sensor is fault
44	44	Air sensor at outdoor unit is fault
45	45	HEX sensor at outdoor unit is fault
46	46	Compressor suction sensor is fault
47	47	Discharge sensor at constant speed compressor is fault
48	48	HEX outlet sensor at outdoor unit is fault
49	49	IPM temperature sensor is fault
50	50	Missing phase among 3 phase
51	51	Over combination ratio
52	52	No communication from inverter PCB detected at main PCB
53	53	Communication fault between indoor and outdoor unit
54	54	Reverse phase is detected
57	57	No communication from main PCB detected at inverter PCB
59	59	Wrong outdoor unit combination

60	60	Inverter EEPROM memory fault
61	61	Outdoor pipe temperature is too high
62	62	IPM temperature is too high
65	65	IPM temperature sensor is fault
67	67	Fan locked or fan start failure
69	69	CT sensor of constant speed compressor 1 is fault
70	70	CT sensor of constant speed compressor 2 is fault
71	71	PFC CT sensor fault
72	72	Fuction error of outdoor 4way valve.(reversing valve)
73	73	DC peak current is over
74	74	Unbalance at 3 phase
75	75	Fan CT sensor fault
76	76	Fan DC link voltage is high
77	77	Fan input voltage is high
78	78	Fan hall sensor fault
79	79	Fan motor start failure
86	86	Main PCB EEPROM is fault
87	87	Fan PCB EEPROM is fault
88	88	PFC PCB EEPROM is fault
90	90	Inlet temperature sensor of external PCB is fault
91	91	Outlet temperature sensor of external PCB is fault
104	104	No Communication from slave is detected
105	105	Communication fault between fan and inverter PCB
106	106	Fan PCB IOM fault
107	107	Fan DC link voltage is low
113	113	Liquid pipe sensor fault
114	114	Subcooling inlet pipe sensor fault
115	115	Subcooling outlet pipe sensor fault
116	116	Oil level sensor fault
145	145	No communication from external PCB is detected at main PCB
151	151	4 way valve failure
153	153	Upper HEX sensor fault
154	154	Bottom HEX sensor fault
173	173	Over / low current at constant speed compressor 1
174	174	Over / low current at constant speed compressor 2
182	182	Communication fault betwen main and sub micom in external PCB
187	187	Hydrokit water temperature sensor fault
190	190	Inverter PCB heak sink temperature is high
191	191	Inverter PCB heat sink temperature sensor fault
193	193	Fan PCB heak sink temperature is high
194	194	Fan PCB heat sink temperature sensor fault
200	200	Auto piping failure
201	201	Fault at liquid pipe sensor of HR unit
202	202	Fault at subcooling inlet pipe sensor of HR unit
203	203	Fault at subcooling outlet pipe sensor of HR unit
204	204	No communication from outdoor unit is detected at HR unit
205	205	HR unit addresses are duplicated
237	237	No response from outdoor unit modem at indoor unit modem
238	238	No response from outdoor unit at outdoor unit modem

Please check your LG manual for more details on the error codes not present in this list or contact your nearest LG support service.